

## CLAIMS

1. A service component for a software agent, the service component being arranged to enable a client agent to interact with a server agent when requesting a service, the  
5 service component comprising:  
a plurality of role components arranged to perform a service interaction between the client agent and the server agent, at least one of said plurality of role components being arranged to be loaded onto said client agent and at least one of said plurality of role components being arranged to be loaded on to said server agent as  
10 appropriate for the interaction, the loaded role components being arranged to provide the client and server agents with information on one or more interaction requirements to enable the requested service to be provided.
2. A service component as claimed in claim 1, wherein at least one of said role  
15 components comprises an Initiator role component provided by a service provider agent to a service consumer agent.
3. A service component as claimed in either claim 1 or claim 2, wherein at least one of  
20 said role component is attached to a component description, the component description including details of the minimum client platform capability of the client agent and the interfaces used by the client agent to interact with the role component.
4. A service component as claimed in any previous claim, wherein at least one of said role components comprises an Initiator role component which can control its state.  
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5. A service component as claimed in any previous claim, wherein at least one of said role components comprises an Initiator role component which can be reused for multiple requests.
- 30 6. A service component as claimed in any preceding claim, wherein each of the plurality of role components is distributed by a mediator agent.
7. A service component as claimed in claim 6, wherein the mediator agent provides each of the plurality of role components dynamically to the client and server agents.  
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8. A service component as claimed in any one of claims 5 or 6, wherein the mediator agent selects one of said plurality of role components as suitable for distribution by using a service description and component description of the role component.
- 5 9. A service component as claimed in any preceding claim, wherein one of said plurality of role components is an Initiator role component provided dynamically to the client agent whilst the client agent is running.
- 10 10. A service component as claimed in any preceding claim, wherein one of said plurality of role components is a Respondent role component provided dynamically to the server agent whilst the server agent is running.
- 15 11. A service component for a software agent, the service component being arranged to enable a user to request a service using a client agent, the client agent arranged to interact with a server agent when requesting the service, the service component comprising:  
a plurality of role components arranged to perform a service interaction between the client agent and the server agent, at least one of the plurality of role components providing the client agent and at least one of the plurality of role components providing the server agent with respectively appropriate information on one or more interaction requirements to enable the requested service to be provided, wherein the service component is dynamically installed into at least one of the client and server agents when these agents are already running.
- 20 25 12. A service component as claimed in claim 11, wherein the service component is generic to the client and server agents.
- 30 13. A service component as claimed in any preceding claim having a data structure which comprises Interaction Protocol information and information comprising a set of components related to one or more finite state machines whose roles are defined in the Interaction Protocol, the service component being arranged to interface with one or more agents to provide role component information selected from said set of components which enables said one or more agents to perform an interaction with one or more other agents according to said Interaction Protocol.

14. An agent internal architecture for dynamically installing and executing role components, the architecture comprising:

- a Co-ordinator controller;
- a Load manager;
- 5 a Component installer; and
- a Package manager.

15. A method of providing a user with access on demand to a remote service, the  
10 method comprising the steps of:

- generating a client agent for the user to request the service from a server agent;
- providing the client agent with at least one service component arranged to modify the client agent to enable the client agent to interact with the server agent when  
15 requesting the service;

- forwarding the modified client agent to a broker to enable the server agent and modified client agent to interact; and
- responding to the client agent's request to provide the requested service,  
wherein the service component provided comprises:

20 a plurality of role components arranged to perform service interactions between the client agent and the server agent, the role components providing the client and server agents with information on the interaction requirements to enable the requested service to be provided.

25 16. A method of providing a user with access on demand to a remote service as claimed in claim 15, wherein the plurality of role components are provided by a mediator agent.

30 17. A method of providing one or more role components to a software agent participating or seeking to participate in an inter-agent interaction in a multi-agent system architecture, the method comprising the steps of:

- determining at least one of a plurality of role components to be used by a service component of said software agent when required for participation in the inter-agent interaction;

identifying a mediator agent in the multi-agent system which is capable of providing at least one role component required by the software agent for participation in the inter-agent interaction, the mediator being identified by means of a service component description as having a suitable role component for the service component;

5       dynamically installing the at least one role component provided by the mediator agent on the software agent; and

          loading the at least one role component on the software agent to enable the software agent to participate in the inter-agent interaction.

10      18. A method as claimed in claim 17, wherein the method is performed dynamically whilst the agent is participating in the inter-agent interaction.

15      19. A method as claimed in claim 18, wherein the software agent is a client agent, and at least one role component provided by the mediator agent is an Initiator role component, and the inter-agent interaction comprises a request for a service by the client agent from a server agent.

20      20. A software agent role component management scheme, the scheme comprising the steps of:

25       determining whether if one or more role components are stored in a downloaded form in a local component storage element; and

          if a downloaded role component is found in a local component storage element, determining if the downloaded role component is an Initiator role component; and

30       if the downloaded role component is an Initiator role component, performing a version check of the downloaded Initiator role component; and if the downloaded role component is not an Initiator role component, locating a Mediator agent having at least one Initiator role component; downloading at least one Initiator role component from the Mediator Agent;

          packaging at least one downloaded Initiator role component into local component storage; and

          instantiating the downloaded Initiator role component.

35      21. A mediator agent arranged to mediate between an initiator agent and at least one respondent agent in a multi-agent system, the mediator agent being arranged to

identify one or more role components provided by a service component of the a multi-agent system which will enable said initiator agent to request a service from at least one respondent agent within the multi-agent system, the mediator agent comprising:

means to provide said one or more identified role components to the client  
5 agent, wherein once the role component is loaded on the client agent, the client agent is provided with information which enables the requested service to be provided by the respondent agent.

22. A multi-agent system comprising one or more service components, each service  
10 component arranged to enable a client agent to request a service from a service agent within the multi-agent system, the system including:

a mediator agent arranged to provide a role component to the client agent, wherein once the role component is loaded on the client agent, the client agent is provided with information which enables the service to be provided by the service  
15 agent.

23. A platform arranged to support one or more applications within a multi-agent system as claimed 22, in which at least one agent is provided with a service component according to any one of claims 1 to 13.  
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24. A platform as claimed in claim 23, wherein the platform is arranged to support an application performing a client role within said a multi-agent system.

25. A platform as claimed in claim 23, wherein the platform is arranged to support an application performing a server role within said a multi-agent system.

26. A platform as claimed in claim 24, wherein the platform comprises a user terminal in a communications system.

30 27. A computer application comprising one or more agents, and arranged to be installed on a platform according to any one of claims 23 to 26.

35 28. Apparatus in a distributed computer environment supporting a multi-agent system, wherein the apparatus provides a platform as claimed in any one of claims 23 to 26.

29. A communications network providing a distributed computer environment supporting a multi-agent system as claimed in claim 22, the network comprising at least one apparatus as claimed in claim 28.

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30. A signal conveying information related to a computer application as claimed in claim 27 over a communications network as claimed in claim 29.

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